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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/596,239	03/02/2007	Paulo Sergio Dainez	033794/312694	3912

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EXAMINER	
JACOBS, TODD D	

ART UNIT	PAPER NUMBER
3746	

MAIL DATE	DELIVERY MODE
12/05/2011	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/596,239	DAINEZ ET AL.	
	Examiner	Art Unit	
	TODD D. JACOBS	3746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 November 2011*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *1-31* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-31* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

12)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This Office Action is in response to the entry dated 11/1/2011 and considers all proposed amendments/arguments.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-5, 9, 12-13, 16, 18-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dovey et al (2003/0219341) in further view of Kim (2003/0044286).

3. In re claims 1, 3, 18, 22-23, Dovey discloses a fluid pump controlling system, the fluid pump comprising a piston (5) displaceable positioned in a cylinder, the cylinder having a piston displacement stroke and the cylinder having a stroke end, the system being characterized by comprising: a sensing assembly (3) measuring the behavior of the piston, and an electronic controller (2) associated to the sensing assembly, the electronic controller monitoring the displacement of the piston within the cylinder by detecting an impact signal, the impact signal being transmitted by the sensing assembly upon occurrence of an impact of the piston with the stroke end, the impact signal being transmitted by the sensing assembly to the electronic controller, the electronic controller successively incrementing the piston displacement stroke (see col 2 lines 15-16 where the stroke is gradually increasing) from the trigger signal (drive signals to/from the diver 4) until the occurrence of the impact to store a maximum value of piston displacement corresponding to the piston displacement as far as the stroke end. Examiner would like to note that Dovey's system has been interpreted to be a calibration having

an initial reading where the voltage increases until the vibration occurs, reduces the stroke, and continually adjusts the stroke if future vibrations occur.

4. However, Dovey fails to disclose wherein the calibration is also run later, after the intitial calibration, if the piston makes an impact. Nevertheless, Kim discloses a similar method that teaches this. See step S41 which performs a task, which was performed before true operation of the compressor, again after impact is detected. If applied to Dovey, this additional step would cause the calibration of Dovey (the process performed before operation of the apparatus) to run again. This gives the advantage of recalibrating which would allow the pump to dynamically change its operating limits. Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify Dovey in view of Kim by adding a recalibration method which would run the calibration again if the piston collided in order to give the pump advantages explained above.

5. In re claim 2, Dovey/Kim discloses a system according to claim 1, characterized in that the maximum value of piston displacement corresponds to a displacement of maximum efficiency of the fluid pump.

6. In re claim 4, Dovey/Kim discloses a system according to claim 1, characterized in that the fluid pump is actuated with a minimum piston displacement stroke (since the stroke is generally increasing there will be a minimum stroke).

7. In re claim 12, Dovey/Kim discloses a fluid pump controlling system, the fluid pump comprising a piston displaceable positioned in a cylinder, the cylinder having a piston displacement stroke and the cylinder having a stroke end, the fluid pump being driven by an electric motor fed by electric power, the system being characterized by comprising: a piston-position sensing assembly, and an electronic controller associated to the sensing assembly, monitoring the piston displacement within the cylinder by detecting an impact signal, the impact

signal being transmitted by the sensing assembly upon occurrence of an impact of the piston with the stroke end, the impact signal being transmitted by the sensing assembly to the electronic controller; the electronic controller successively incrementing the piston displacement stroke from a trigger signal until the occurrence of impact to store a maximum value of piston displacement, and monitoring the piston displacement within the cylinder and preventing displacement as far as the maximum value of piston displacement.

8. In re claim 13, Dovey/Kim discloses a system according to claim 12, characterized in that the electronic controller prevents piston displacement as far as the stroke end by decrementing the level of voltage applied to the motor (see col 2 line 21 of Dovey).

9. In re claim 16, Dovey/Kim discloses a system according to claim 13, characterized in that the sensing assembly comprises a position sensor to sense the piston displacement, the position sensor being associated to the electronic controller.

10. In re claim 19, Dovey/Kim discloses a method according to claim 18, characterized in that, prior to the step (a), a step of incrementing the piston stroke is performed.

11. In re claim 20, Dovey/Kim discloses a method according to claim 19, characterized in that, prior to the step of incrementing the piston stroke, the fluid pump is started with a minimum piston displacement stroke (since in Dovey/Kim the stroke is continually increasing as explained above, there must be started with a minimum stroke).

12. In re claim 21, Dovey/Kim discloses a method according to claim 20, characterized in that the step of starting the fluid pump with a minimum piston displacement stroke is carried out upon initiating the functioning of the fluid pump (this minimum stroke is started when the pump is starting).

13. In re claim 24, Dovey/Kim discloses a method according to claim 18, characterized in that, after the step (II), the piston stroke is operated in a constant way (a closed loop operation takes place after Dovey is calibrated).

14. In re claim 25, Dovey/Kim discloses a method according to claim 24, characterized in that, after the step of operating the stroke in a constant way, the storage of the value of the maximum piston displacement at the electronic controller is performed (after the steady state performance of the pump which comes after the calibration, if the piston again hits the cylinder there is a new storage of the maximum displacement (note that this “displacement” may be in terms of stroke distance, voltage, etc).

15. In re claim 26, Dovey/Kim discloses a method according to claim 24, characterized in that, after the step of operating the stroke in a constant way, the piston stroke is monitored (after the closed loop operation after the calibration begins, the piston stroke is still monitored via the sensor).

16. In re claim 27, Dovey/Kim discloses a fluid pump controlling method, the fluid pump comprising a piston displaceably positioned in a cylinder, the cylinder having a piston displacement stroke and the cylinder having a stroke end, the method being characterized by comprising the steps of: (a) turning on the fluid pump, causing the piston to displace in the cylinder; (b) successively increment the piston stroke as far as the occurrence of an impact thereof with the stroke end, (c) monitoring the piston stroke for a stabilization time between the successive increments of the stroke, and (d) decrementing the piston stroke if an impact occurs during the stabilization time.

17. In re claim 28, Dovey/Kim discloses a method according to claim 27, characterized in that, in the step (a), the piston stroke of the fluid pump is initiated with a minimum displacement stroke.

18. In re claim 29, Dovey/Kim discloses a method according to claim 28, characterized in that, after the step (d), the monitoring of the piston displacement is performed.

19. In re claim 30, Dovey/Kim discloses a linear compressor comprising a piston displaceably positioned in a cylinder, the cylinder having a piston displacement stroke and the cylinder having a stroke end, the system being characterized by comprising: a piston-position sensing assembly, and an electronic controller associated to the sensing assembly, the electronic controller monitoring the piston displacement within the cylinder by detecting an impact signal, the impact signal being transmitted by the sensing assembly upon occurrence of an impact of the piston with the stroke end, the impact signal being transmitted by the sensing assembly to the electronic controller, the electronic controller successively incrementing the piston displacement stroke as far as the occurrence of the impact to store a maximum value of piston displacement (note that this stored value may be in terms of voltage, stroke length, etc).

20. In re claim 5, Dovey discloses a system according to claim 3, characterized in that the fluid pump is actuated upon occurrence of the trigger signal.

21. In re claim 9, Dovey discloses a system according to claim 5, characterized in that the sensing assembly comprises a position sensor (the position sensor is the impact sensor; when the impact or vibration occurs there is a position known) of the piston displacement stroke, the position sensor being associated to the electronic controller.

22. Claims 1-5, 9, 12-13, 16, 18-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dovey/Kim in further view of Yang (6,176,683).

23. In re claims 1-5, 9, 12-13, 16, 18-30, one may disagree that Dovey/Kim directly discloses the claimed invention including for example storing a maximum value of piston displacement and monitoring the displacement and preventing displacement as far as the maximum displacement. This is because Dovey/Kim may not (without taking away from the above)

directly disclose the feedback, especially as claimed. Nevertheless, Yang discloses an impact preventing linear compressor that discloses such a feedback system as claimed. This includes, as seen on Fig 3, detecting a collision and storing a new stroke in the system (as opposed to backing off on the voltage). Also, as seen on Fig 3, the stroke is at least monitored at S03, S04 because once this stroke is monitored it is placed into the stroke input S01. While Dovey may be vague about the control loops used to control the piston system, Yang discloses a suitable system for Dovey that could give higher efficiency. Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify Dovey/Kim in view of Yang by changing the feedback cycle slightly to improve efficiency.

24. Claims 6-7, 10-11, 14, 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dovey/Kim, or Dovey/Kim/Yang, as disclosed above, in further view of Oltman (5,224,835).

25. In re claims 6, 10, 14, 17, Dovey/Kim and Dovey/Kim/Yang fail to disclose a high pass or a low pass filter for the signal associated with the electronic controller. Nevertheless, Oltman discloses using both a high and a low pass filter in order to remove noise from vibration detectors (col 7, lines 1-10). This makes the sensors more effective. Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to use high and low pass filters as taught by Oltman to make the sensors more effective.

26. In re claim 11, Dovey discloses a system according to claim 10, characterized in that the signal of piston displacement within the cylinder is transmitted to the electronic controller, the electronic controller preventing the piston displacement as far as the stroke end.

27. In re claim 7, Dovey discloses a system according to claim 6, characterized in that the sensing assembly comprises an impact sensor associated to the cylinder of the fluid pump.

28. Claims 8, 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dovey/Kim in view of Oltman as applied above in further view of Yang.

29. In re claims 8, 15, Dovey/Kim/Oltman fails to disclose a system according to claims 7 and 14, characterized in that the sensing assembly comprises an accelerometer fixed close to the cylinder of the pump fluid, the impact signal being generated by the accelerometer.

30. Nevertheless, Yang discloses that when detecting a piston hitting a cylinder/valve plate one could use a vibration sensor as taught by Dovey but also says one could use an accelerometer (col 4 lines 49-50). Depending on exterior system constraints (exterior vibration that could make the vibration sensor inaccurate, etc), one type of sensor (vibration or acceleration) may be more accurate and it would have been an obvious design choice by one having ordinary skill in the art to choose either of these sensors depending on those design constraints.

31. Claims 8, 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dovey/Kim/Yang in view of Oltman, as applied above.

32. In re claims 8, 15, Dovey/Kim/Yang/Oltman fails to disclose a system according to claims 7 and 14, characterized in that the sensing assembly comprises an accelerometer fixed close to the cylinder of the pump fluid, the impact signal being generated by the accelerometer.

33. Nevertheless, Yang discloses that when detecting a piston hitting a cylinder/valve plate one could use a vibration sensor as taught by Dovey but also says one could use an accelerometer (col 4 lines 49-50). Depending on exterior system constraints (exterior vibration that could make the vibration sensor inaccurate, etc), one type of sensor (vibration or acceleration) may be more accurate and it would have been an obvious design choice by one having ordinary skill in the art to choose either of these sensors depending on those design constraints.

34. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stuber (4,179,630) or Kim'734 (2003/0161734) in further view of Dovey/Kim.

35. In re claim 31, both Stuber and Kim'734 disclose an environment cooler but may fail to disclose the elements of claim 1. Nevertheless, Dovey/Kim as explained above discloses these elements and provides and easy and efficient method of maximizing efficiency for a linear compressor. Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify Stuber or Kim'734 in view of Dovey/Kim in order to achieve the advantages above.

Response to Arguments

36. Applicant's arguments filed have been fully considered but they are not persuasive. Applicant argues that Dovey fails to teach increasing the voltage until vibration/contact occurs. Examiner disagrees. As discussed in Dovey, and pointed out above, "the controller is set to deliver a gradually increasing voltage across the driver...receipt of the signal from the vibration sensor then causes the controller to reduce the drive voltage to the driver". Since Dovey teaches gradually increasing the voltage, there ultimately will in fact be impact. Applicant further argues that Kim fails to disclose the recalibration method as claimed, because Kim discloses "resetting" the maximum amplitude by subtracting an amount from the previously used amplitude. Examiner disagrees. As discussed above, in step S41, Kim discloses recalibrating the maximum amplitude if a collision is detected. When applied to Dovey, one would interpret the method of Kim to "reset maximum amplitude" as running the calibration technique of Dovey, because the calibration method of Dovey is how the amplitude is set, and resetting this amplitude would mean re-calibrating the amplitude with the method of Dovey. Also, one could interpret Kim's exact resetting method as being the calibration method of Dovey. That is, increasing the stroke until impact, backing the piston off, and storing the new maximum displacement.

Conclusion

37. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TODD D. JACOBS whose telephone number is (571)270-5708. The examiner can normally be reached on Monday - Friday, 7:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Devon Kramer can be reached on 571-272-7118. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Charles G Freay/
Primary Examiner, Art Unit 3746

/TODD D JACOBS/
Examiner, Art Unit 3746